

1. A vaporizer for vaporizing a liquid and mixing the vaporized liquid with a carrier gas, comprising:

a valve body defining a control valve cavity having first, second and third apertures,

a gas inlet port connected to said first aperture through a first fluid channel for receiving said carrier gas at a given pressure,

a liquid inlet port connected to said second aperture through a second fluid channel for receiving said liquid at a flow rate and a pressure above said given pressure,

a closure element disposed adjacent to said second aperture for forming a vaporization region having a pressure gradient, said vaporization region circumscribing said liquid inlet port and having a substantially larger width than said inlet port, and

an outlet port connected to said third aperture through a third fluid channel,

wherein liquid supplied through said liquid inlet port vaporizes in said valve cavity to form a vaporized liquid, mixes with said carrier gas, and is carried out of said vaporizer through said outlet port.

2. The vaporizer of claim 1, wherein

said closure element is a diaphragm movable relative to said second aperture to increase or decrease said flow rate and further comprising

an actuator for moving said diaphragm toward and away from said second aperture in response to a control signal.

1 3. The vaporizer of claim 2, further comprising
2 a liquid flow meter connected to measure the flow rate
3 of liquid into said liquid inlet port,
4 a feedback control system for providing said control
5 signal in response to a flow rate measured by said liquid flow
6 meter so as to regulate the flow rate of the liquid to
7 approximate a selected value.

1 4. The vaporizer of claim 2, wherein said actuator is
2 a piezoelectric member responsive to said control signal.

1 5. The vaporizer of claim 1 further comprising a
2 heater for heating at least a portion of said valve body near
3 to said cavity so as to inhibit said liquid from condensing
4 after it has vaporized.

1 6. The vaporizer of claim 2 further comprising a
2 heater for heating at least a portion of said valve body near
3 to said cavity so as to inhibit said liquid from condensing
4 after it has vaporized.

1 7. The vaporizer of claim 3 further comprising a
2 heater for heating at least a portion of said valve body near
3 to said cavity so as to inhibit said liquid from condensing
4 after it has vaporized.

1 8. A chemical vapor deposition system using a liquid
2 reactant and a carrier gas, comprising:

3 a chemical vapor deposition chamber having a gas inlet
4 port, and

5 a liquid reactant vaporizer having an outlet p rt
6 connected to said chamber inlet port, said vaporizer
7 comprising:

8 a valve body defining a control valve cavity
9 having first, second and third apertures, said outlet
10 port connected to said third aperture through a first
11 fluid channel,

12 a gas inlet port connected to said first aperture
13 through a second fluid channel for receiving said
14 carrier gas at a given pressure,

15 a liquid inlet port connected to said second
16 aperture through a third fluid channel for receiving
17 said liquid reactant at a flow rate and a pressure
18 above said given pressure,

19 a diaphragm disposed adjacent to said second
20 aperture for forming a vaporization region having a
21 pressure gradient, said vaporization region
22 circumscribing said liquid inlet port and having a
23 substantially larger width than said inlet port, and

24 wherein liquid reactant supplied through said
25 liquid inlet port vaporizes in said valve cavity to
26 form a vaporized reactant, mixes with said carrier
27 gas, and is carried out of said vaporizer through said
28 outlet port.

